

The Efficacy and Safety of Barefoot Style Running Shoes: A Summary of Evidence

Purpose: Identify the efficacy and safety of barefoot style running shoes through literature review and interviews with musculoskeletal experts within the Navy and in the national human performance industry.

Definition: Minimal footwear are shoes that allow the foot to function naturally without providing additional support or cushioning. Shoes like Vibrams are true minimal footwear. Other commercial products like the Nike Free shoes do not have much support, but there is some cushioning provided.

Data Collection and Analysis: The Navy and Marine Corps Public Health Center (NMCPHC) and Center for Personal and Professional Development (CPPD) conducted a comprehensive literature review (see references page 3 and 4), and professional interviews with recognized industry experts, and utilizing data from two national running biomechanics laboratories:

- 1: Harvard University Skeletal Biology Lab <http://www.barefootrunning.fas.harvard.edu/>
- 2: University of Delaware Davis Motion Analysis Laboratory and the University of Delaware Running Injury Clinic. <http://www.udel.edu/PT/davis/index.htm>

Background: Data collection and analysis indicate people who run using barefoot style running shoes avoid —heel striking|| instead of landing on the midfoot or forefoot. In doing so, runners avoid potentially damaging impacts. Most shoe runners – approximately 75% of Americans- heel strike, causes a very large and sudden collision force about 1000 times per mile run (*Hasegawa, 2007*). People who run using barefoot style running shoes, land toward the middle or front of the foot – causing less collision force (*Lieberman, 2010*). By landing on the middle or front of the foot, the impact force reduces the impact force to 60% of one's bodyweight, much less than most —traditional running shoe|| runners generate when they heel strike. Humans have engaged in running for thousands of years, but the modern running shoe was not invented until the 1970's (*Bramble & Lieberman, 2004*). For most of human evolutionary history, runners were apparently safely running either barefoot or using minimal footwear such as sandals or moccasins with smaller heels and little cushioning (*Lieberman, 2004*). Harvard University's Skeletal Biology Lab indicates that they may have been able to do so by forefoot or midfoot striking. (NOTE: See video on heel strikes and ground reaction forces on webpage:

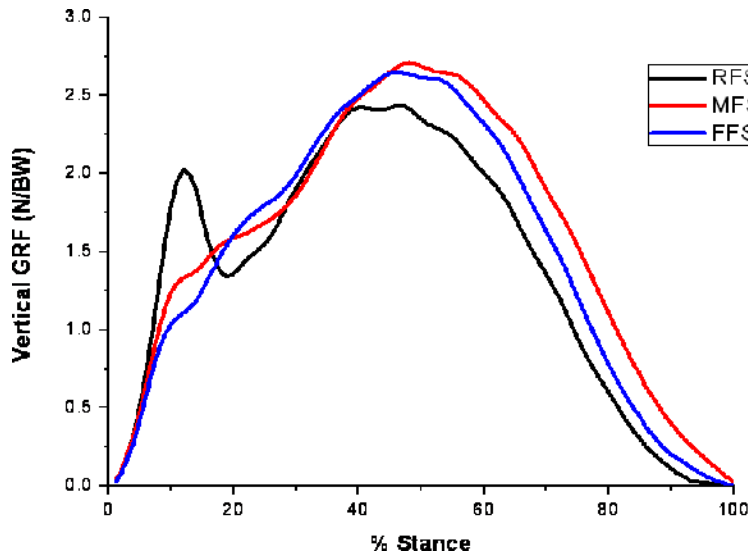
<http://www.barefootrunning.fas.harvard.edu/4BiomechanicsofFootStrike.html>

The Pros of Barefoot Style Running Shoes:

1. Lack of arch support results in strengthening of the arch musculature (*Robbins 1987, Bruggeman*). A stronger foot is a healthier foot and more resistant to injury (*Davis, 2010*).
2. Lack of wide heel reduces excessive pronation at footstrike during running (*Nigg/Davis 2010*).
3. Greater sensory input with less between the foot and the ground (*Shinowara, 2010*).
4. With no cushioning – land softer – less stiff (*Bishop, Farley*).
5. With no cushioning – land on midfoot/forefoot – significantly reduces the impact peak /reduce risk for injury (*Altman, Milner, Pohl, Davis*).
6. For the performance of non-running physical training activities (i.e., pillar preparation, movement preparation, strength training, and recovery), the barefoot style running shoes

provide heightened proprioception / kinesthetic awareness improving movement efficiency, balance, and kinetic chain integrity. (Cook, 2010), (Horne,2010).

7. Interestingly, the Vibrams were designed originally as boat shoes. (Davis, 2010).



Graph demonstrates a vertical ground force of a midfoot (MFS), forefoot (FFS) and rearfoot (RFS) strike landing. Based on preliminary results of this study, it appears that an increase in impact loading (heel strike) amplifies the risk of developing a running related injury. (Davis & Bowser, 2010)

The Cons/Safety Concerns of Barefoot Running Shoes:

1. Less overall support of the foot . requires greater demand of the foot and posterior lower leg muscles . increases the risk for injury of these structures if not adequately trained (Davis, 2010).
2. Less overall protection of the foot (Davis, 2010).
3. Require transition protocols . gradual progression for soft tissue to accommodate to stress and to learn new gait/running style (Fishell-NSWG4, 2010).
4. Not recommended for anyone with pre-existing foot problems or anyone that is successfully utilizing foot orthotics (Cook, 2010).

Conclusion:

There is insufficient evidence to support or refute the efficacy and safety of Barefoot Style Running Shoes for military personnel.

References:

Biomechanical Motion Analysis Laboratories:

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2. <http://www.barefootrunning.fas.harvard.edu/>
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2. Irene Davis, 2010: Professor, Program of Physical Therapy, University of Delaware. Conducts research in the Davis Motion Analysis Laboratory. Director of the University of Delaware Running Injury Clinic. Director of Research for Drayer Physical Therapy Institute. <http://www.udel.edu/PT/davis/index.htm>
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